Assessment of heavy metal uptake and translocation in Dyera costulata for phytoremediation of cadmium contaminated soil

ABSTRACT

Heavy metal pollution is a widespread global problem causing serious environmental concern. Cadmium, one of the heavy metals, is water soluble and can be transferred from soil to plants and enter into the food chain. It is detrimental to human health because it accumulates in the body and can cause renal tubular dysfunction, pulmonary emphysema and osteoporosis. This heavy metal needs to be cleaned up for a clean and safe environment. An experiment was conducted to evaluate the potential of Dyera costulata as a phytoremediator to absorb cadmium from contaminated soils. Dyera costulata seedlings were planted on six different growth media (soil + different levels of cadmium): Control, 25 ppm Cd, 50 ppm Cd, 75 ppm Cd, 100 ppm Cd and 150 ppm Cd. The highest growth performance mainly height, basal diameter and number of leaves were in the control, 50 ppm Cd and 25 ppm Cd treatments, respectively. The highest accumulation of cadmium (52.9 ppm) was in the 75 ppm Cd treatment. Among the plant parts, leaves showed the highest concentration of cadmium. Dyera costulata showed high translocation factor and low bioconcentration factor values in soil at high cadmium concentrations and was also able to tolerate and accumulate high concentrations of cadmium. The roots of Dyera costulata were found to be suitable for the absorption of cadmium in contaminated soils. This species can be an efficient phytoremediator for soils contaminated with cadmium.

Keyword: Cadmium accumulation; Contaminated soil; Dyera costulata; Phytoremediation